

# A PENAEID POSTLARVAL CHARACTER OF TAXONOMIC VALUE<sup>1</sup>

ROBERT D. RINGO<sup>2</sup> AND GILBERT ZAMORA, JR.

*Bureau of Commercial Fisheries Biological Laboratory, Galveston, Texas*

## ABSTRACT

The presence of spines on the dorsal carina of the sixth abdominal segment distinguishes postlarval brown shrimp (*Penaeus aztecus*) and pink shrimp (*P. duorarum*) from postlarval white shrimp (*P. setiferus*), which lack these spines. The spine character was validated by examination of postlarvae of known parentage—51 brown, 53 pink, and 99 white shrimp, 5 to 25 mm long.

## INTRODUCTION

Studies of the biology of postlarval brown (*Penaeus aztecus*), pink (*P. duorarum*), and white (*P. setiferus*) shrimp have been hampered by difficulties in identifying them. Pearson's (1939) descriptions and Williams' (1959) provisional key have been used to identify postlarval brown and white shrimp of 10 mm in total length or less. Problems in identification of postlarvae 10 to 25 mm long were noted by Baxter & Renfro (1966) who mainly resorted to seasonal occurrence and size to distinguish postlarval brown and white shrimp entering Galveston Bay. Brown and pink shrimp are easily distinguished from white shrimp by the presence or absence of the rostral groove when the shrimp are above 25 mm long.

In examining postlarvae from Galveston Bay, we noted a morphologic character by which it is possible to distinguish brown from white shrimp when the individuals are between 10 and 25 mm in total length. The presence of spines on the dorsal carina of the sixth abdominal segment of brown shrimp and the absence of spines on the dorsal carina of white shrimp distinguish the two species. Spines, or their absence, are little needed for specific identification in larger shrimp because the rostral groove then present on brown shrimp distinguishes them from the non-grooved white shrimp. This character is especially valuable in areas such as the Galveston Bay system where pink shrimp are rarely found.

The objectives of this study were: (1) to validate the dorsal-carina character from known-parentage brown, pink, and white postlarval shrimp; (2) to determine the accuracy of Pearson's (1939) and Williams' (1959) characters in identifying known-parentage postlarvae; and (3) to determine whether the dorsal-carina character can be used to distinguish brown from pink postlarval shrimp.

<sup>1</sup> Contribution No. 230, Bureau of Commercial Fisheries Biological Laboratory, Galveston, Texas.

<sup>2</sup> Present address: Bureau of Sport Fisheries and Wildlife, Division of River Basin Studies, Sacramento, California.

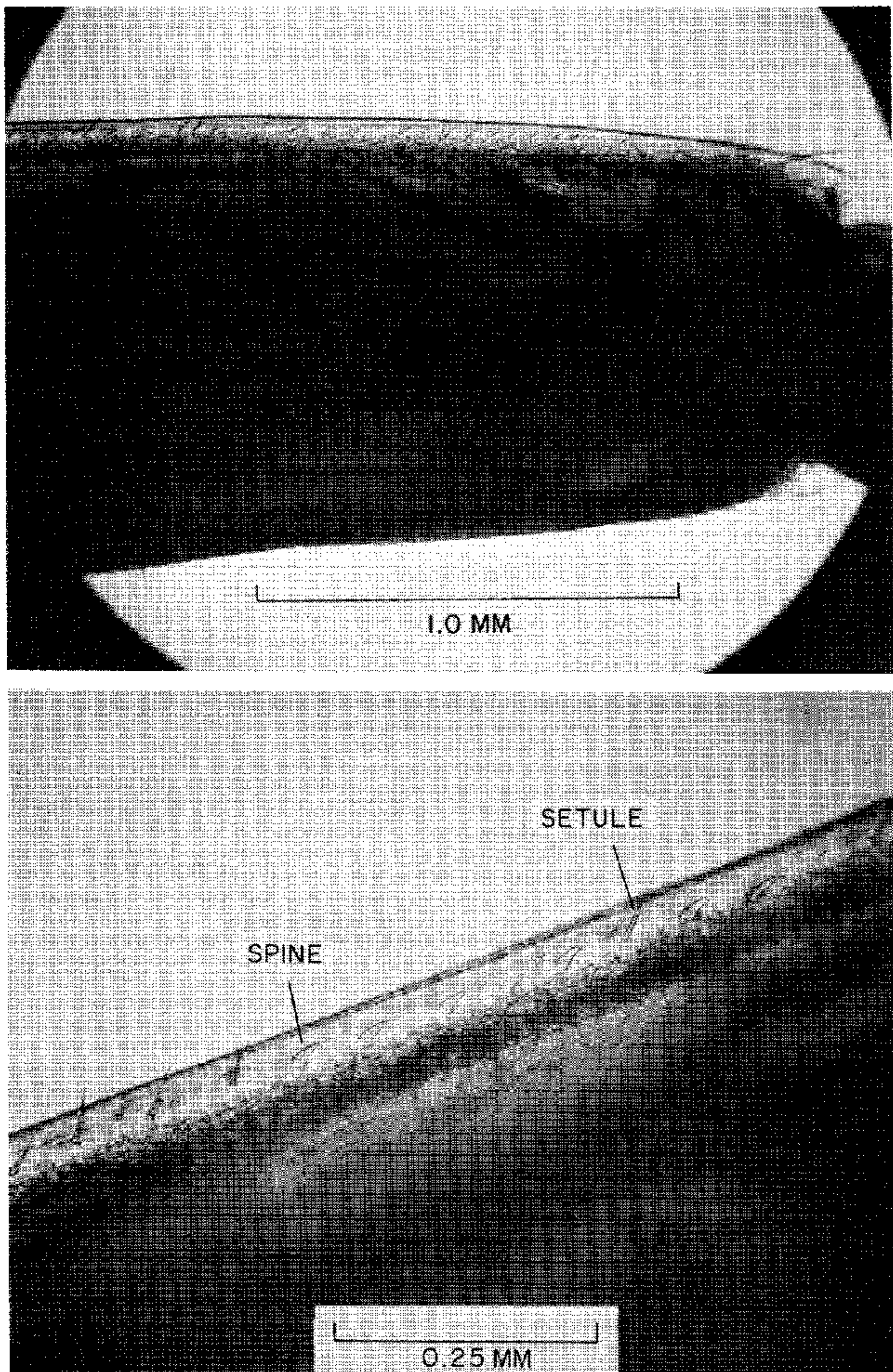


FIGURE 1. Dorsal carina spines on postlarval brown shrimp. Photographs of 13-mm postlarva at 19 $\times$  (top) and 63 $\times$  (bottom).

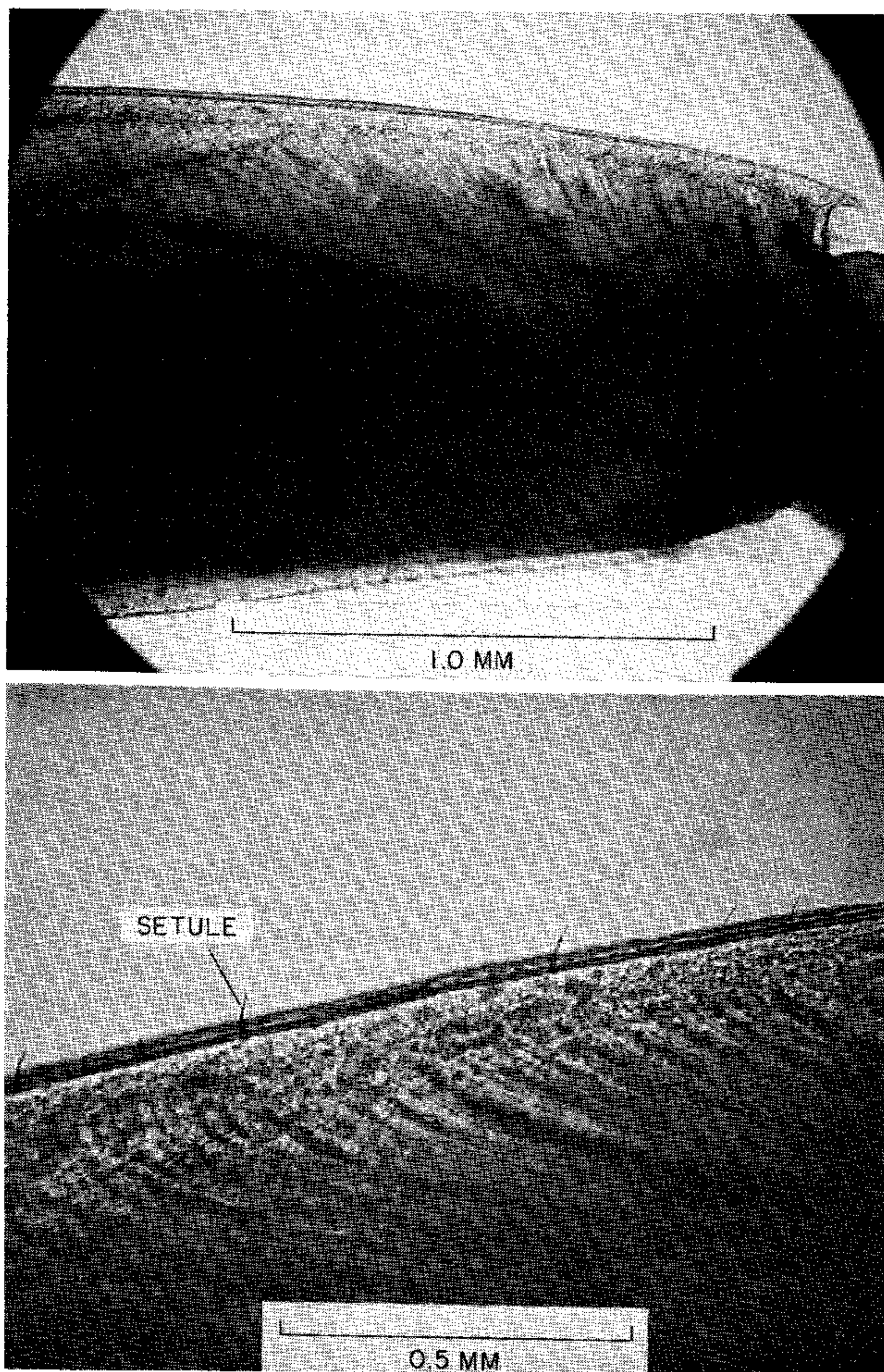


FIGURE 2. Dorsal carina of white shrimp, showing absence of spines. Photographs of 13-mm postlarva at 19 $\times$  (top) and 63 $\times$  (bottom).



DORSAL CARINA SPINES AS A CHARACTER FOR IDENTIFICATION  
OF POSTLARVAL SHRIMP

In this study, 51 brown, 53 pink, and 99 white postlarval shrimp of known parentage were examined. The shrimp were reared by Harry L. Cook and M. Alice Murphy, Bureau of Commercial Fisheries, Galveston, Texas.

Postlarvae were examined and measured at magnifications from  $7\times$  to  $150\times$ . Shrimp were measured to the nearest millimeter of total length (from tip of rostrum to tip of telson), and the occurrence and number of spines were recorded. Measurements of spines were made to the nearest 0.01 mm with a calibrated ocular micrometer.

On postlarval brown and pink shrimp 5 to 12 mm long, spines are in a discontinuous row on each side of the dorsal midline (precursor of the dorsal carina) of the sixth abdominal segment. At a length of 13 mm or more, the spines are usually in a continuous row on both sides of the dorsal carina (Fig. 1, top). Under low magnification ( $19\times$ ), the spines cause the dorsal carina to appear serrated. These same spines under higher magnification ( $63\times$ ) exhibit a robust appearance, having a broad base and short length that distinguish them from the setules (Fig. 1, bottom). The size of the spines increases with increase in the length of the shrimp. Spines were 0.01 mm or less in length on 5-mm postlarvae, but ranged from 0.02 to 0.04 mm on 13-mm postlarvae.

The absence of dorsal-carina spines on white shrimp (Fig. 2) clearly distinguishes postlarvae of this species from those of brown and pink shrimp.

To examine further the usefulness of the dorsal-carina spines in identification, all known-parentage brown and white shrimp were separated by using (1) the spine character, and (2) a combination of the following characters presented by Pearson (1939) and Williams (1959):

<u>Brown shrimp</u>	<u>White shrimp</u>
1. Rostrum extending to distal edge of eye.	1. Rostrum not extending to distal edge of eye.
2. Third pereopod extending beyond distal edge of eye.	2. Third pereopod not extending beyond distal edge of eye.
3. Posterior rostral spines far apart.	3. Posterior rostral spines close together.
4. Ventral rostral spines relatively near together and proximal.	4. Ventral rostral spines relatively far apart and distal.
5. Antennal scale broadly rounded.	5. Antennal scale acutely rounded.

We were 100 per cent accurate in separating postlarvae of brown and white shrimp using the spine character (Table 1). Errors ranged from 0 to 38 per cent when the same shrimp were separated with the characters given by Pearson (1939) and Williams (1959).

TABLE 1

PERCENTAGE ERROR IN IDENTIFICATION OF KNOWN-PARENTAGE POSTLARVAL BROWN AND WHITE SHRIMP IN RELATION TO LENGTH

Total length (mm)	Brown shrimp			White shrimp		
	Number examined	Number correctly identified	Per-centage error	Number examined	Number correctly identified	Per-centage error
Spine character						
5- 6	11	11	0	7	7	0
7-10	14	14	0	21	21	0
11-25	26	26	0	71	71	0
Pearson-Williams characters						
5- 6	11	7	36	7	7	0
7-10	14	14	0	21	20	5
11-25	26	16	38	71	48	32

The numbers of dorsal carina spines on known-parentage brown and pink shrimp (Table 2) demonstrate that the character cannot be used to separate postlarvae of these species. The number of spines for each species generally increases with increasing size. For shrimp of a given length, the number of spines differs little between the two species.

ACKNOWLEDGMENTS

The authors express their appreciation to Mr. Harry L. Cook for technical laboratory guidance, Mr. Daniel Patlan for the photographs, and Mr. Lee Trent for valuable criticism of the manuscript.

TABLE 2

AVERAGE NUMBER OF SPINES ON KNOWN-PARENTAGE POSTLARVAL BROWN AND PINK SHRIMP IN RELATION TO LENGTH

Total length (mm)	Brown shrimp			Pink shrimp		
	Number of speci-mens	Number of spines		Number of speci-mens	Number of spines	
		Average	Range		Average	Range
5- 7	12	2.2	1- 9	9	2.4	1- 8
8-10	13	12.5	4- 32	10	15.9	3- 34
11-13	5	30.6	20- 46	6	31.7	25- 40
14-16	3	59.0	52- 72	9	50.8	40- 59
17-19	6	76.8	55-104	2	59.0	58- 60
20-22	10	73.2	58- 90	4	71.5	68- 76
23-25	2	83.0	76- 90	13	75.3	46-100

## SUMARIO

UN CARACTER DE VALOR TAXONOMICO EN LA POSTLARVA DE LOS *Penaeus*

La presencia de espinas en la carina dorsal del sexto segmento abdominal sirve para distinguir la postlarva del camarón carmelita (*Penaeus aztecus*) y del camarón rosado (*P. duorarum*) de la postlarva del camarón blanco (*P. setiferus*), que no tiene estas espinas. El valor de la espina como carácter distintivo fue establecido tras el examen de postlarvas de origen conocido—51 carmelitas, 53 rosadas y 99 blancas, de 5 a 25 mm de longitud.

## LITERATURE CITED

BAXTER, K. N. AND W. C. RENFRO

1966. Seasonal occurrence and size distribution of postlarval brown and white shrimp near Galveston, Texas, with notes on species identification. Fishery Bull. Fish Wildl. Serv. U. S., 66(1): 149-158.

PEARSON, J. C.

1939. The early life histories of some American Penaeidae, chiefly the commercial shrimp, *Penaeus setiferus* (Linn.). Fishery Bull. Fish Wildl. Serv. U. S., 49(30): 1-73.

WILLIAMS, A. B.

1959. Spotted and brown shrimp postlarvae (*Penaeus*) in North Carolina. Bull. Mar. Sci. Gulf & Carib., 9(3): 281-290.